

WE CLAIM

1. Face detection apparatus generating an output indicative of the likelihood of test regions of a test image containing a face, the apparatus comprising:

(i) logic to derive a plurality of sets of image attribute data from a test region, each set relating to said test region scaled by a respective different scaling factor from a geometric progression of scaling factors, said progression being such that each scaling factor is related to a next scaling factor by a predetermined multiplicative factor, said factor being the same across the whole progression of scaling factors;

(ii) a first comparator to compare said derived attributes for each scaling factor with a first respective set of attributes indicative of the presence of a face to generate a first respective likelihood value;

(iii) a second comparator to compare said derived attributes for each scaling factor with a second respective set of attributes indicative of the presence of a face to generate a second respective likelihood value;

(iv) a generator to generate a combined likelihood value in respect of at least a subset of said scaling factors by combining the first likelihood value applicable to that scaling factor with the second likelihood value applicable to a further scaling factor separated from that scaling factor in the geometric progression by a predetermined number of positions; and

(v) logic to derive a probability of the presence of a face at each scaling factor in the subset by a similarity between said derived attributes and said combined likelihood value in respect of that scaling factor.

2. Apparatus according to claim 1, in which:

(i) said second sets of attributes are indicative of the presence of a central portion of a face in said test region; and

(ii) said generator is operable to combine the first likelihood value applicable to a scaling factor at which said test region represents a certain area of said test image with said second likelihood value applicable to a further scaling factor in which said test region represents a smaller area of said test image.

3. Apparatus according to claim 1, arranged to derive a combined likelihood value which, across said progression of scaling factors, is indicative of the highest likelihood of a face being present in that test region.

4. Apparatus according to claim 1, said apparatus being operable to compare likelihood values across a plurality of different test regions to detect a likelihood value which, across said progression of scaling factors and across said plurality of test regions, is indicative of the highest likelihood of a face being present.

5. Apparatus according to claim 1, in which the predetermined multiplicative factor is $\sqrt[4]{2}$.

6. Apparatus according to claim 1, in which said generator is operable to combine said first likelihood value applicable to a scaling factor with said second likelihood value applicable to a further scaling factor separated from that scaling factor in said geometric progression by three positions.

7. Video conferencing apparatus comprising apparatus according to claim 1.

8. Surveillance apparatus comprising apparatus according to claim 1.

9. A method of face detection for generating an output indicative of the likelihood of test regions of a test image containing a face, said method comprising the steps of:

(i) deriving a plurality of sets of image attribute data from a test region, each set relating to said test region scaled by a respective different scaling factor from a geometric progression of scaling factors, said progression being such that each scaling factor is related to a next scaling factor by a predetermined multiplicative factor, said factor being said same across the whole progression of scaling factors;

(ii) comparing said derived attributes for each scaling factor with a first respective set of attributes indicative of the presence of a face to generate a first respective likelihood value;

(iii) comparing said derived attributes for each scaling factor with a second respective set of attributes indicative of said presence of a face to generate a second respective likelihood value;

5 (iv) generating a combined likelihood value in respect of at least a subset of the scaling factors by combining said first likelihood value applicable to that scaling factor with said second likelihood value applicable to a further scaling factor separated from that scaling factor in said geometric progression by a predetermined number of positions; and

10 (v) deriving a probability of said presence of a face at each scaling factor in said subset by a similarity between said derived attributes and said combined likelihood value in respect of that scaling factor.

15 10. Computer software having program code for carrying out a method according to claim 9.

11. A providing medium for providing program code according to claim 10.

20 12. A medium according to claim 11, said medium being a storage medium.

13. A medium according to claim 12, said medium being a transmission medium.